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Docket No.: KCC-17,458



THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Roger Bradshaw QUINCY, III

Serial No: 10/037, 466

Filing Date: 21 December 2001

Title: ANTIMICROBIAL NONWOVEN WEBS FOR PERSONAL CARE ABSORBENT ARTICLES

Customer No. 35844

Confirmation No. 5169

Group No.: 3761

Examiner: C. Anderson

**REQUEST FOR RECONSIDERATION**



**Mail Stop AF**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Applicant respectfully requests reconsideration of the final rejection of Claims 1-37, set forth in the Office Action dated 25 November 2003.

**I hereby certify that this correspondence (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on**

22 January 2004

22 Jan. 2004
**Date**

Mark J Peterson
**Signature**

Applicant's independent Claims 1, 13 and 23 recite an antimicrobial nonwoven web, absorbent nonwoven web, or non-retentive nonwoven web which includes *inter alia* a halogenated polystyrene hydantoin including a plurality of repeating units and halogen atoms chemically linked to the repeating units. Each of the repeating units includes an amide nitrogen atom and an imide nitrogen atom. At least about 90% of the halogen atoms are chemically linked to the amide nitrogen atoms.

As explained on page 9 of Applicant's specification, the claimed invention is enabled, in part, by the availability of a new chlorinated polystyrene hydantoin from the HaloSource Corp., designated Poly-1-C1, Type 2, in which all of the chlorine atoms are linked to amide nitrogen atoms. The new chlorinated polystyrene hydantoin is made using a proprietary process, unknown to Applicant. Previously, there was no commercially available halogenated polystyrene hydantoin in which all, or substantially all, of the halogen atoms were linked to amide nitrogen atoms.

The Examiner rejected Claims 1-31 under 35 U.S.C. §103(a) as obvious over U.S. Publication 2002/0077612 (Quincy, III) in view of U.S. Patent 6,548,054 (Worley). This rejection is respectfully traversed.

First, the Examiner mischaracterizes Quincy, III by stating that the reference:

> does not disclose any specifics of the polystyrene hydantoin (Office Action, p. 3).

As explained in Applicant's previous response, Quincy, III discloses a di-halogenated polystyrene hydantoin having a chemical formula $C_{12}H_{10}X_2N_2O_2$, wherein "X" refers to chlorine or bromine (p. 3, par. 0037). The fact that two halogen ("X") groups are present means that both the amide and imide nitrogens are halogenated. Therefore, in order to support the obviousness rejection, the Examiner must show that:

> a) the secondary reference (Worley) discloses a halogenated polystyrene hydantoin in which all or substantially all (about 90% or more) of the halogen atoms are attached to the amide nitrogens, and
>
> b) a person skilled in the art would have been motivated to substitute such a halogenated polystyrene hydantoin (if disclosed in Worley) for the di-halogenated polystyrene hydantoin disclosed in Quincy, III.

**a) Worley Does Not Disclose A Halogenated Polystyrene Hydantoin In Which All Or Substantially All Of The Halogen Atoms Are Attached To The Amide Nitrogens**

The Examiner relies on the formula at Col. 4, lines 34-63 of Worley as disclosing a halogenated polystyrene hydantoin in which "100% of the halogen atoms are linked to the amide nitrogen" (Office Action, p. 3). Worley does not disclose, and does not enable production of, such a compound.

The chemical formula disclosed in Worley describes only a single monomer unit in a crosslinked polystyrene hydantoin polymer. The single monomer unit includes an X group attached to an amide nitrogen and an X' group

attached to an imide nitrogen. Each X and X' can be independently chlorine, bromine or hydrogen, provided that at least one of X and X' is chlorine or bromine.

When read in the context of the remainder of the Worley specification, the chemical formula indicates that any single monomer unit in a polymer may have halogen atoms attached to both, or only one, of the amide and imide nitrogen atoms. The reference does not disclose a halogenated polystyrene hydantoin polymer in which all or substantially all of the halogen atoms in the entire polymer are chemically linked to amide nitrogen atoms. Worley apparently was unable to make such a polymer.

The efforts by Worley to make halogenated polystyrene hydantoin polymers are set forth in the Examples. Example 1 describes a successful effort to make a di-chlorinated polystyrene hydantoin in which both amide and imide nitrogens were chlorinated (Col. 5, lines 20-29). Example 3 describes a successful effort to make a di-brominated polystyrene hydantoin in which both amide and imide nitrogens were brominated (Col. 9, lines 19-27). If the procedure of Example 3 is instead performed at a higher pH, the presence of mono-brominated polystyrene hydantoin becomes "predominant" (Col. 9, lines 27-32). However, Example 3 does not disclose a product in which 90% or more of the bromine atoms are attached to amide nitrogens (which would require the presence of very little or no di-brominated polystyrene hydantoin in the product).

Example 4 describes efforts by Worley to make mono-chlorinated polystyrene hydantoin, by reducing the level of chlorine in the reaction mixture, and raising the pH. One experiment resulted in "a mixture of the dichloro derivative and a substantial amount of the monochloro sodium salt" (Col. 10, lines 31-33). Another experiment resulted in a similar mixture containing "a lesser proportion of monochlorinated sodium salt" (Col. 10, lines 44-56). Another procedure resulted in "primarily the dichloro derivative, but some of the monosodium salt" (Col. 10, lines 56-65). Still another experiment resulted in "primarily the monochloro sodium salt, but some of the dichloro derivative" (Col. 11, lines 17-20). None of the experiments resulted in a product in which 90% or more of the chlorine atoms are attached to amide nitrogens (which would require the presence of very little or no di-chlorinated polystyrene hydantoin in the product).

A fair reading of Worley is that halogenated polystyrene hydantoins can be produced which contain either di-halogenated molecular units, or a mixture of di-halogenated and mono-halogenated molecular units. Some conditions result in a predominance of di-halogenated molecular units, while others result in a predominance of mono-halogenated molecular units. Worley does not enable or disclose production of a halogenated polystyrene hydantoin in which all or substantially all (i.e., 90% or more) of the halogen atoms are attached to amide nitrogen groups (resulting in very little or no di-halogenated molecular units).

Dependent Claims 2-4 and 16-18 require even higher percentages of the halogen atoms to be attached to the amide nitrogen groups. Accordingly, these claims are even further from the prior art disclosure than the independent claims.

**b) Even If Worley Did Disclose A Halogenated Polystyrene Hydantoin As Claimed, A Person Skilled In The Art Would Not Have Been Motivated To Substitute This Polymer For the Di-Halogenated Polystyrene Hydantoin Disclosed In Quincy, III**

Even if Worley disclosed a halogenated polystyrene hydantoin having 90% or more of its halogen atoms attached to amide nitrogens, the Examiner has not established a motive for substituting this polymer for the di-halogenated polystyrene hydantoin disclosed in Quincy, III (p. 3, par. 0037). Quincy, III discloses only the di-halogenated version, useful in swim wear, and indicates that halogenation can be initially accomplished in order to "activate" the antimicrobial agent. Then, the activated compound can be "stabilized" by exposure to chlorinated or brominated swim water while a wearer is in a swimming pool (p. 3, par. 0037).

The water in a chlorinated or brominated swimming pool is inherently slightly acidic. Worley teaches that maximum halogenation is achieved at a pH of 6-7 (Col. 7, lines 5-7). Accordingly, use of the halogenated polystyrene hydantoins of Worley in the environment described in Quincy, III (i.e., swimming pool water) would maintain the compounds in a state of maximum halogenation

(di-halogenation) and would not favor the formation or existence of mono-halogenated polystyrene hydantoin compounds.

Furthermore, Worley does not provide any motivation to use mono-halogenated polystyrene hydantoins in a swimming pool environment as described in Quincy, III. Worley teaches that high levels of chlorine, including free chlorine, are desirable in water disinfectant applications (Col. 7, lines 11-13). Worley therefore implies that di-chlorinated polystyrene hydantoins which have higher chlorine levels, and which release free chlorine, are favored for use in swim water.

Finally, the combined disclosure of Quincy, III and Worley teaches away from Applicant's invention. Quincy, III discloses that the halogenated polystyrene hydantoin is added to swim wear to reduce the level of bacteria in swim water (Abstract), and discloses the use of di-halogenated polystyrene hydantoins for this purpose (p. 3, par. 0037). Worley discloses that di-halogenated polystyrene hydantoins are favored in an acidic environment, and higher free chlorine contents are desirable for water disinfecting applications, which include swim water (p. 7, lines 5-17). Applicant's invention, by contrast, is directed to minimizing the release of free chlorine using the claimed halogenated polystyrene hydantoin chemistry (pp. 7-8). Thus, while the combination of Quincy, III and Worley would maximize chlorine (and free chlorine) content in swim water using di-halogenated polystyrene hydantoins, Applicant's invention minimizes free

chlorine using a substantially mono-chlorinated polystyrene hydantoin as described on page 7 and defined by the limitations of Applicant's independent claims.

The Examiner rejected Claims 32-37 under 35 U.S.C. §103(a) as obvious over Quincy, III and Worley, further in view of U.S. Patent 6,183,763 (Beerse). Claims 32-37 depend from Claim 1, 13 or 23, and are patentable for at least the same reasons. Beerse does not overcome any of the foregoing deficiencies.

Applicants believe that the claims, as now presented, are in condition for allowance. If the Examiner feels that any issues remain unresolved, then Applicant's attorney requests a telephone interview, as indicated in the last office action response.

Respectfully submitted,

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